

REMARKS

Claims 1-36 are pending in this application. The original patent (US 5,867,214) issued with claims 1-18. Claims 19-34 were added with the preliminary amendment filed February 2, 2001. In a June 3, 2002 Amendment A, Claims 16, 19, and 24-28 were amended relative to that preliminary amendment and Claim 35 was added. In a May 2003 RCE attaching a February 2003 Amendment B, Claims 16, 19, 24-28 and 35 were amended relative to Amendment A and Claim 36 was added.

In this Amendment C, Claims 16, 17, 19, 24, 27, 35 and 36 are herein amended relative to Amendment B. No new matter is introduced hereby.

The Examiner objected to claims 18 and 26, and rejected claims 16, 17, 19, 24, 25, 27, 31, 32, 35 and 36 over Parulski et al. (US 5,633,678) and Kosonocky et al. (US 5,355,165) and claim 32 over Parulski combination with Aciu et al. (US 5,625,412). The Examiner allowed claims 1-15, 20-23, 28-30, 33, and 34.

Applicants traverse the Examiner's rejections with respect to the pending claims as amended.

Claim 16 recites (*italics emphasis added*):

16. (four times amended) An apparatus for increasing [a digital camera] image capture rate, comprising:

an imaging device for generating raw image data responsive to an image capture request;

a **digital memory** buffer for initially storing the raw image data;

first routines for conveying the initially stored raw image data away from the [frame] **digital memory** buffer to a second memory [**location**] to provide space for storing additional, subsequently captured images, wherein the raw image data is stored in uncompressed form in the second memory [**location**] **and wherein the second memory has the capacity to store complete raw image data for multiple raw images**;

second routines for conveying said raw image data from the second memory to a processor for processing said raw image data and for storing said processed image data; and

a central processing unit coupled to the imaging device and to the digital memory buffer, for executing according to a predetermined set of priorities the first and second routines;

wherein the first routines are assigned priority over the second routines to thereby facilitate the rapid conveyance of raw image data away from the [frame] digital memory buffer.

Digital cameras traditionally capture images on analog storage elements (such as CCDs), convert the analog impressions to digital, and store the digital raw image data in a *digital memory* buffer (also known as a “frame buffer” or “image buffer”) to await processing. The problem in the art addressed by the claimed invention is that *this digital memory buffer has limited storage capacity*. When it gets full, no more pictures can be taken. Photos can be compressed to take less space, but compression takes time. Compressing each photo as it is taken delays taking of the next photo. Waiting until the digital memory buffer is full and then compressing the photos causes even greater delay. The claimed invention maintains the digital memory buffer in a condition to receive new image data from the imaging device.

Claims 16, 19, 24, 27, 35 and 36 as amended clarify that the claimed invention improves the functioning of this digital memory buffer, not the functioning of the collection of serial analog storage elements in the CCD that initially senses an image. Fig. 2-4 of the application illustrate the analog image sensor / analog signal processor (Fig. 2) as distinct from the digital memories such as flash memory and various RAM (Fig. 3, 4). Fig. 6 and 7 show preferred embodiments of the apparatus and process in the specification – note that the image sensor, analog processor and A/D converter are not in these figures because they are not central to the patent’s improved way of managing the digital memory.

The claimed invention quickly empties the *digital memory* buffer by moving the raw image data to a second memory prior to processing. This second memory is either (i) large enough to store multiple complete raw images or (ii) external to any processing chip. The conveyance of data to such a second memory is designed to maintain the digital memory buffer

in a condition to receive new image data from the image capture device sensor. The time consuming process of compression is postponed in favor of a higher priority task—moving raw image data in uncompressed form out of the way in order to provide space for storing additional, subsequently captured images. Raw image data *from the second memory* is then compressed.

Parulski does not show conveying the initially stored raw image data away from a digital memory buffer to a second memory in uncompressed form to provide space for storing subsequently captured images, where the second memory is either (i) large enough to store multiple complete raw images or (ii) external to any processing chip. Only after compression does Parulski send the data to a memory that meets either of these criteria. (Parulski col. 4, lines 36-37) Kosonocky is of no assistance because it appears to concentrate on analog image sensors in digital cameras; it does not address the digital memory buffer where images are initially stored after they've been converted to digital.

Parulski also does not show conveying raw image data from such a second memory to be compressed. Rather, in Parulski, "once a certain amount of digital image data has accumulated in the image buffer **18** [which is the first digital memory], the stored data is applied to a programmed digital signal processor **22**, which...compresses each still image stored in the image buffer **18**." (Parulski col. 4 lines 22-30). Applicant respectfully submits that Kosonocky must not be used to construe the image buffer (the first digital memory) as a *second* digital memory simply by calling the analog pixel storage elements in an image sensor the first digital memory.

Claim 36 addresses the case where there is no second processor performing the compression beyond the central processing unit.

Thus, all independent claims are patentable over Parulski.

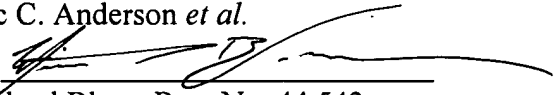
Dependent Claims 17, 25, 26, 31 and 32 should be allowed by virtue of their dependence on allowable claims.

If the Examiner believes that any issues remain outstanding prior to allowance of the remainder of the pending claims, she is respectfully invited to contact the undersigned attorney to resolve such issues in an expedient manner.

Favorable action is solicited.

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Respectfully submitted,
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